

A Diagnostic Comparison of CFSv1 and CFSv2 Predictions of Niño3.4 SST

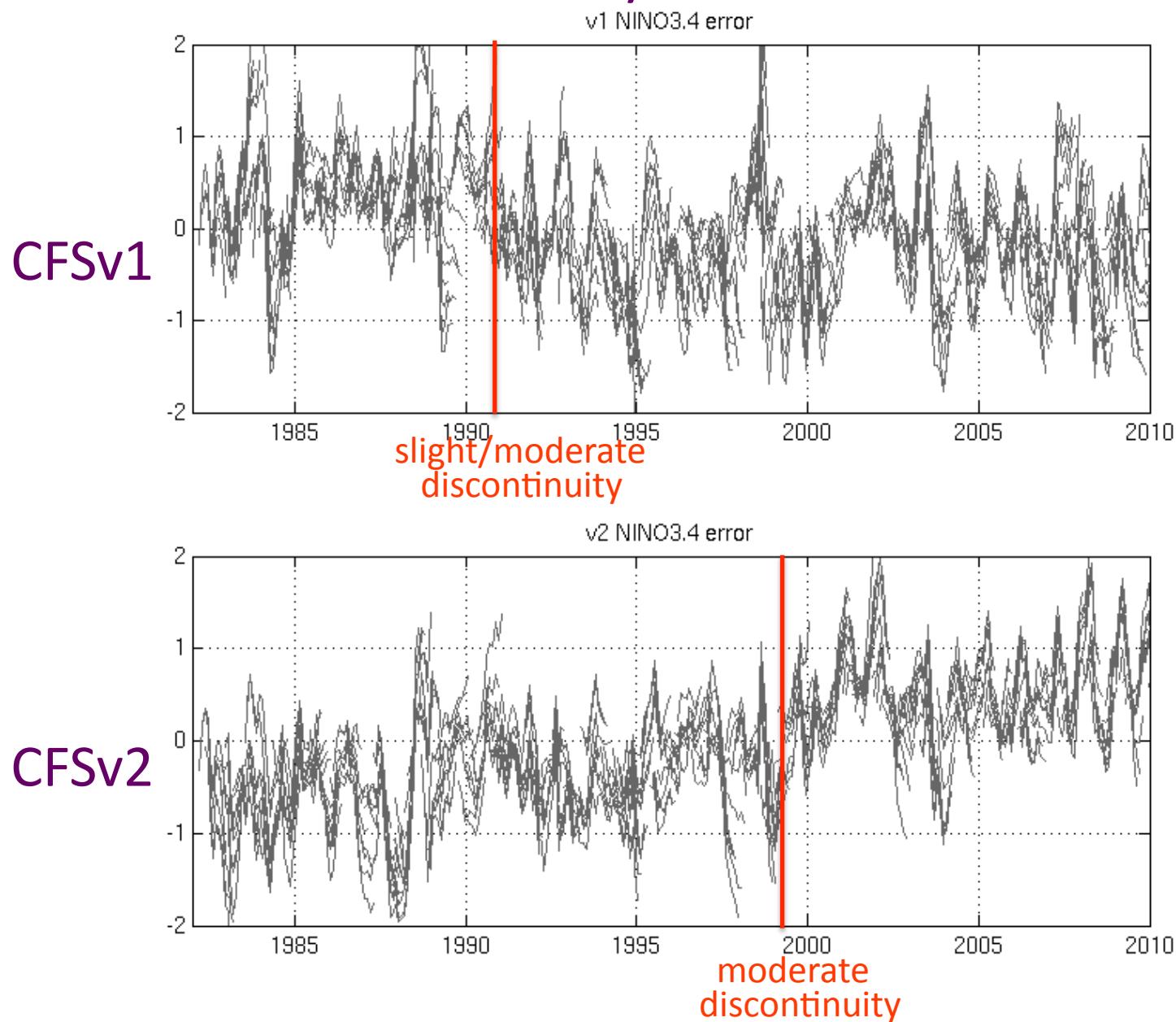


Tony Barnston and Michael Tippett

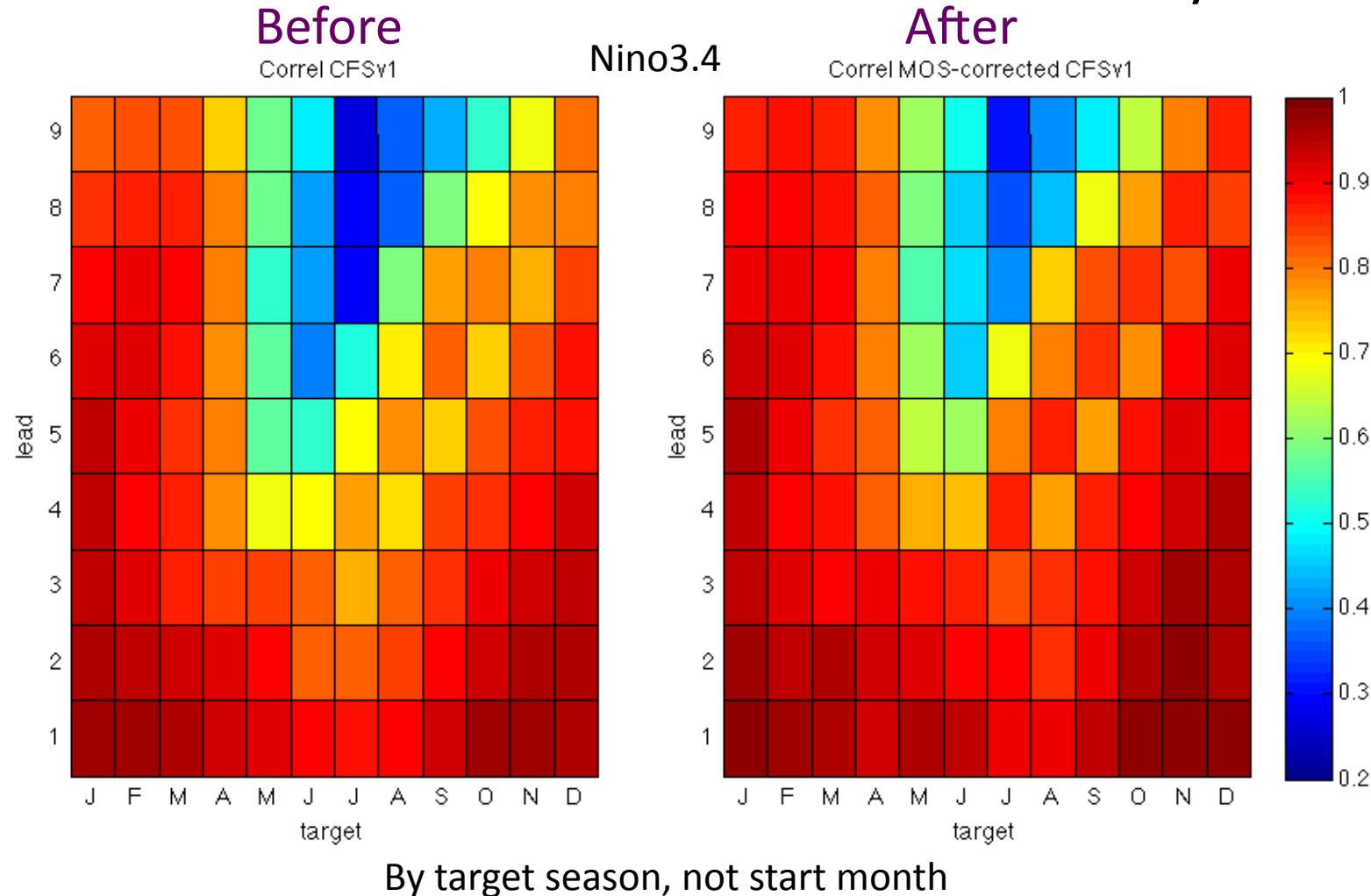
IRI

April 30, 2012

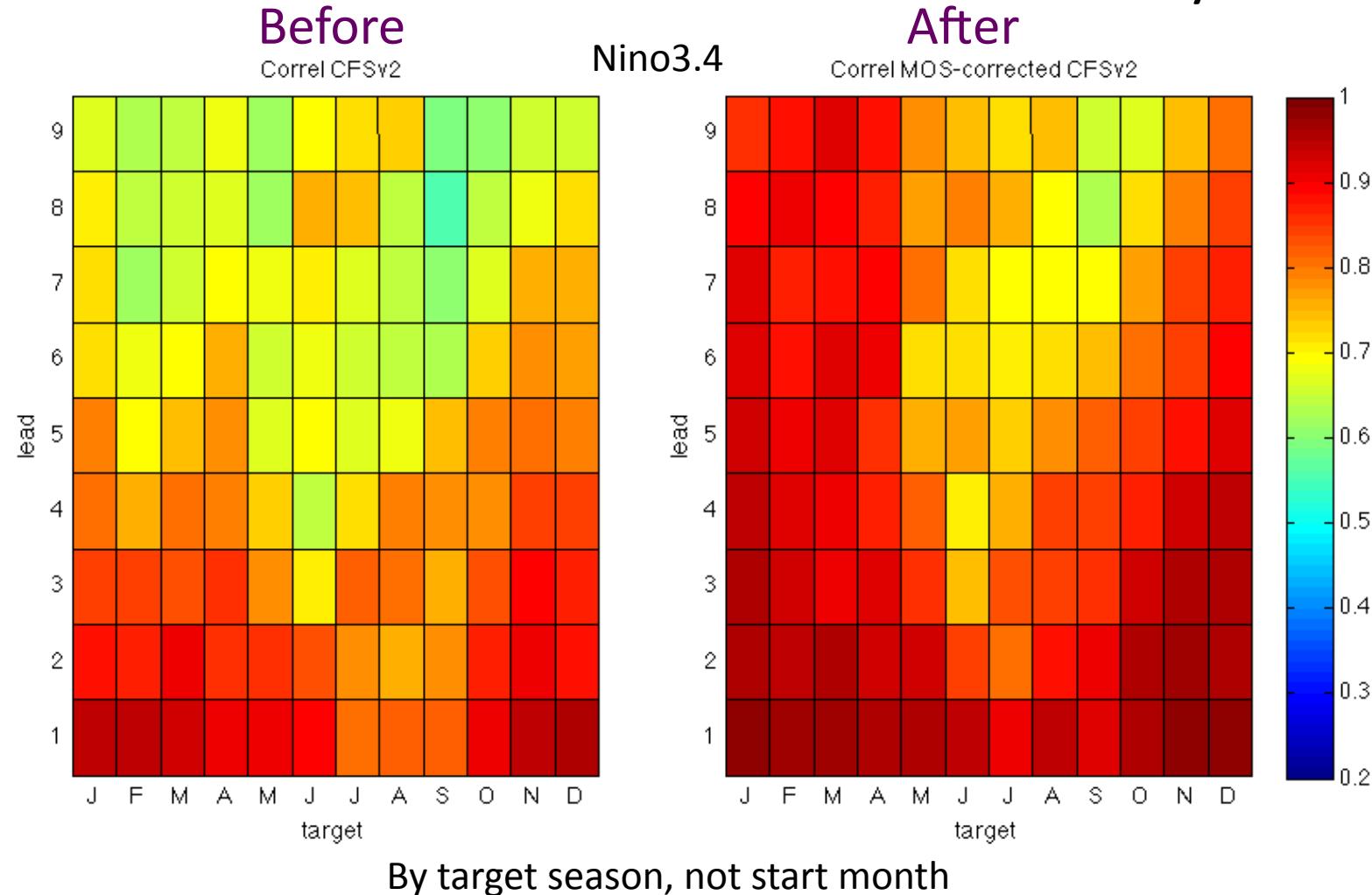
Error of CFSv1 and CFSv2 by start time: All seasons/leads



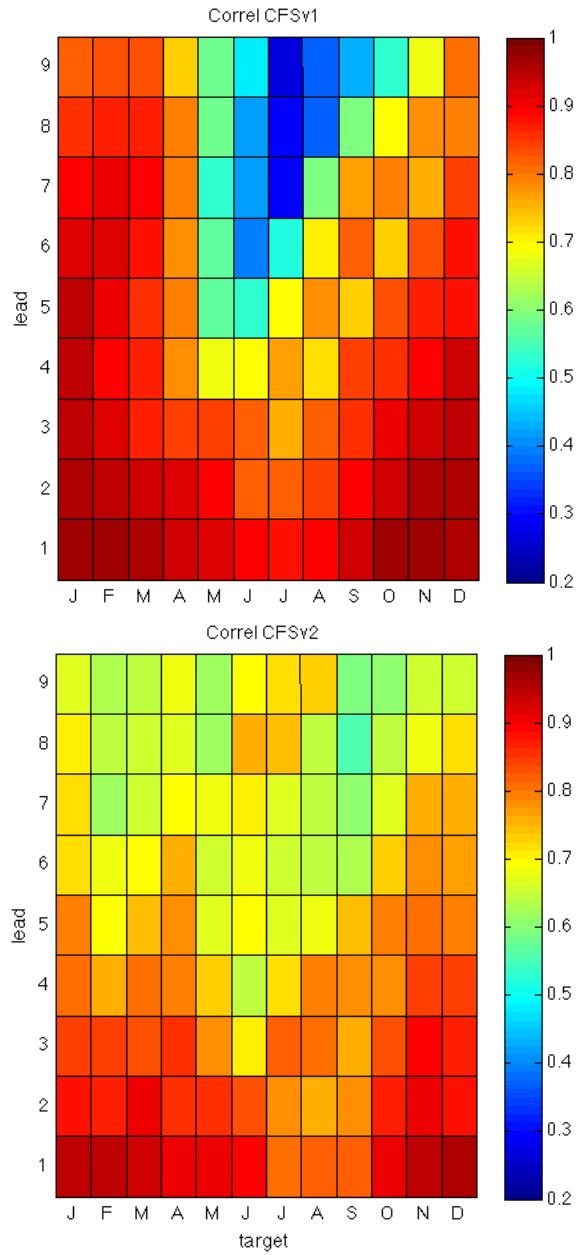
CFSv1: Anomaly correlation before and after correction in 1991 for climate discontinuity



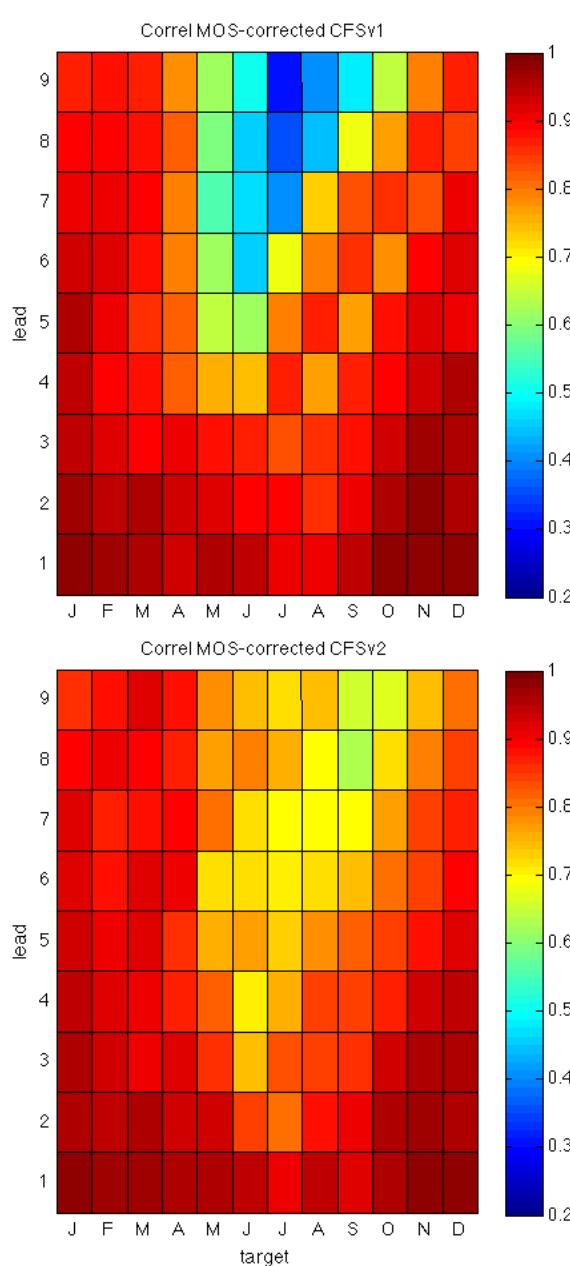
CFSv2: Anomaly correlation before and after correction in 1999 for climate discontinuity



Uncorrected



Corrected

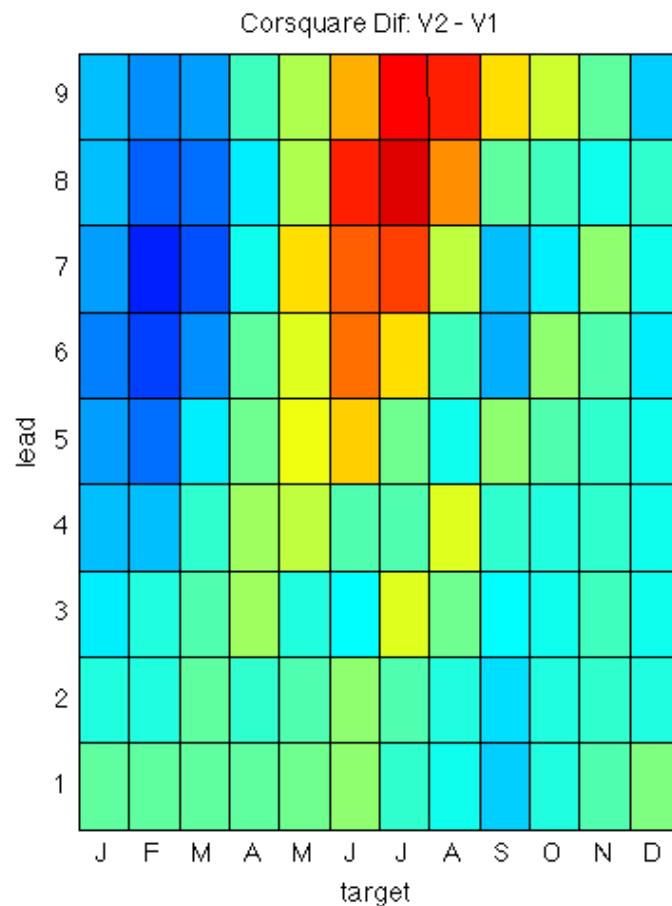


CFSv1

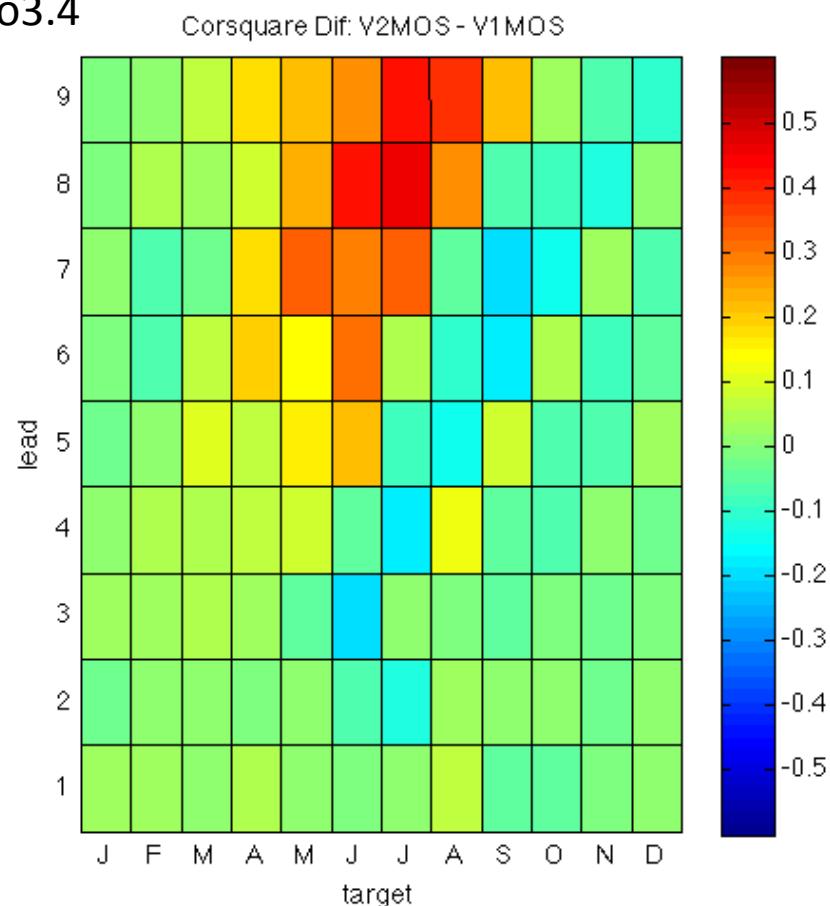
CFSv2

Difference betw CFSv2 vs. CFSv1 **squared anomaly correlation** before and after climate discontinuity corrections

v2-v1 Difference Before

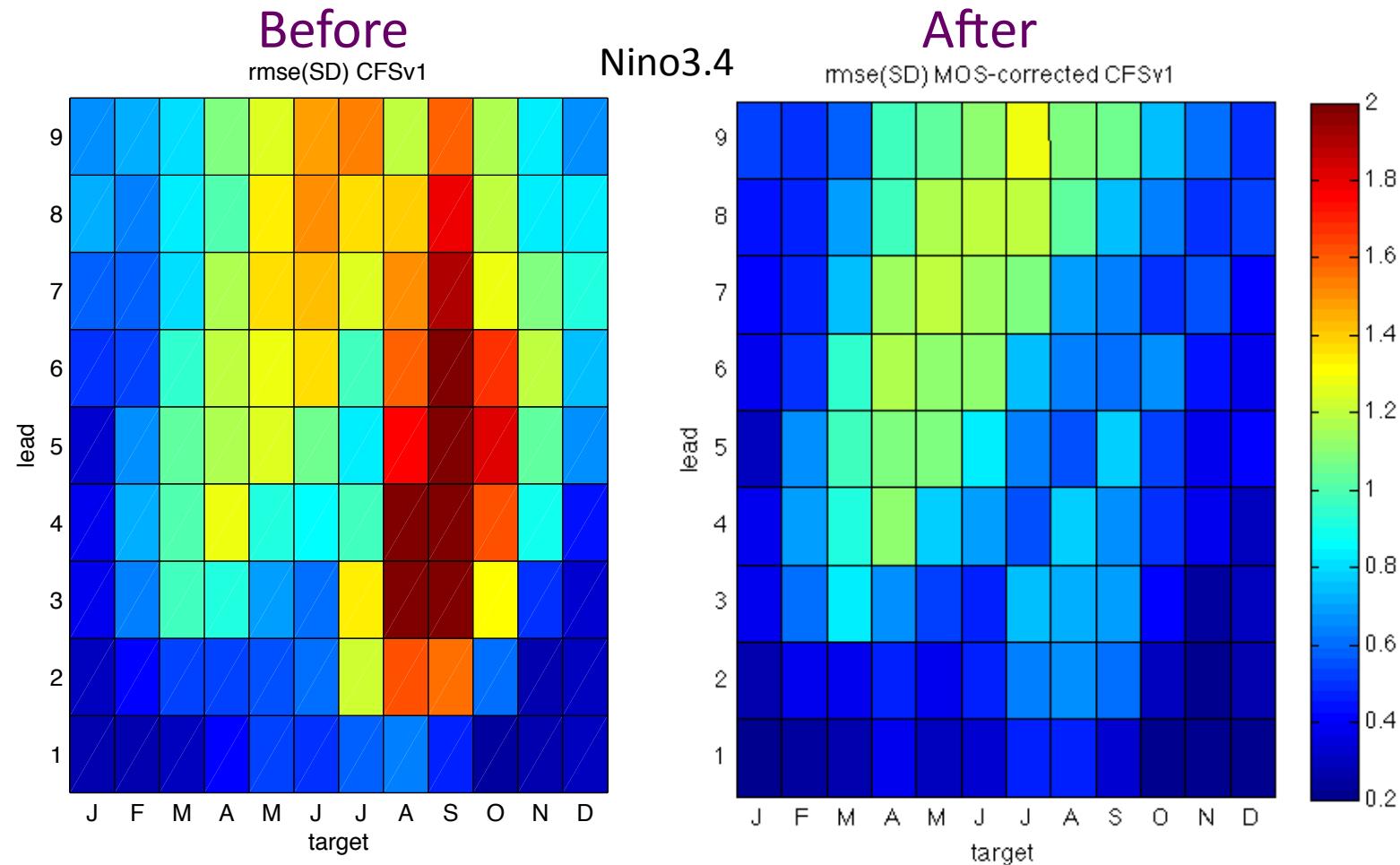


v2-v1 Difference After

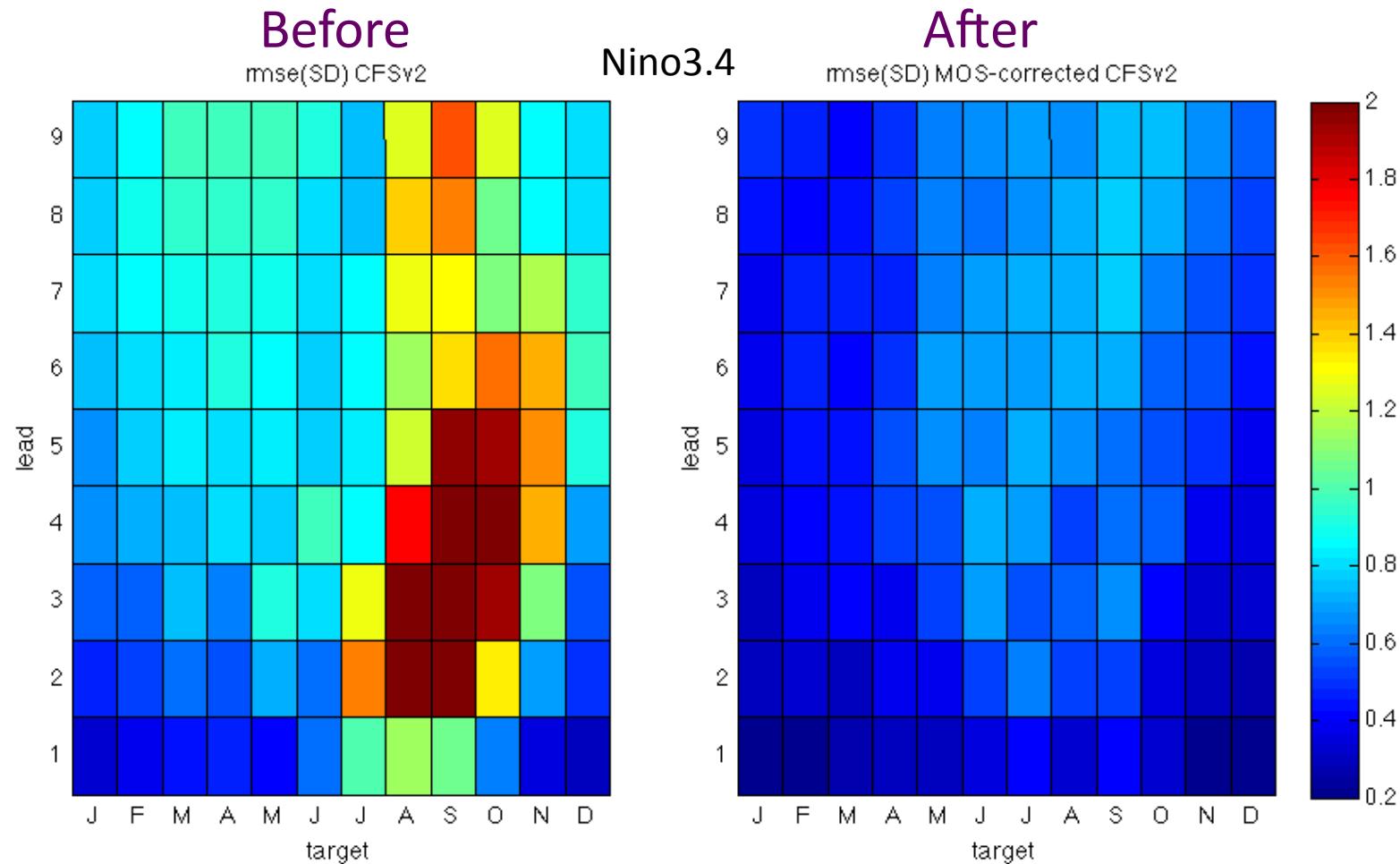


By target season, not start month

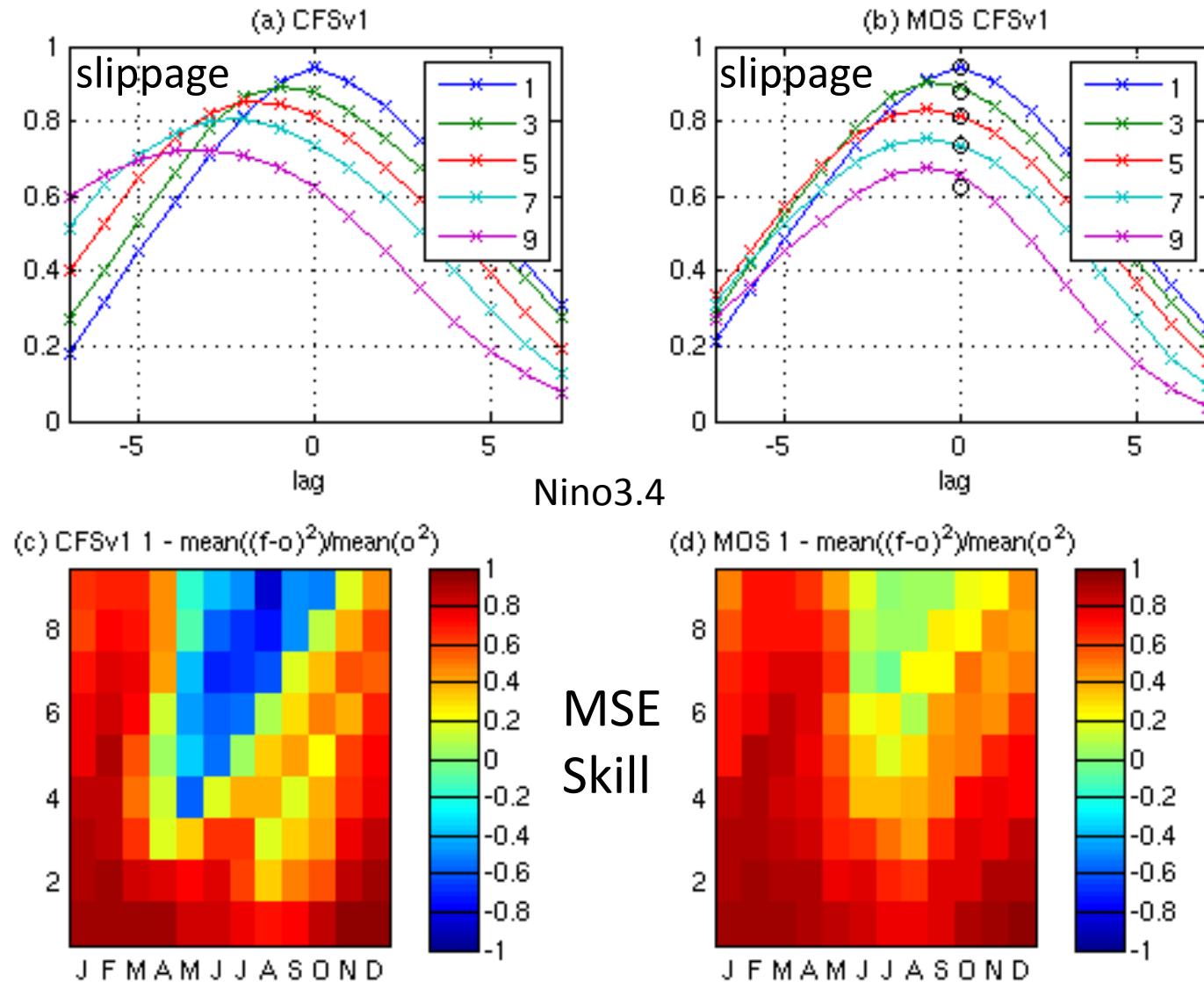
CFSv1 rmse(SD) before and after 1991 climate discontinuity corrections



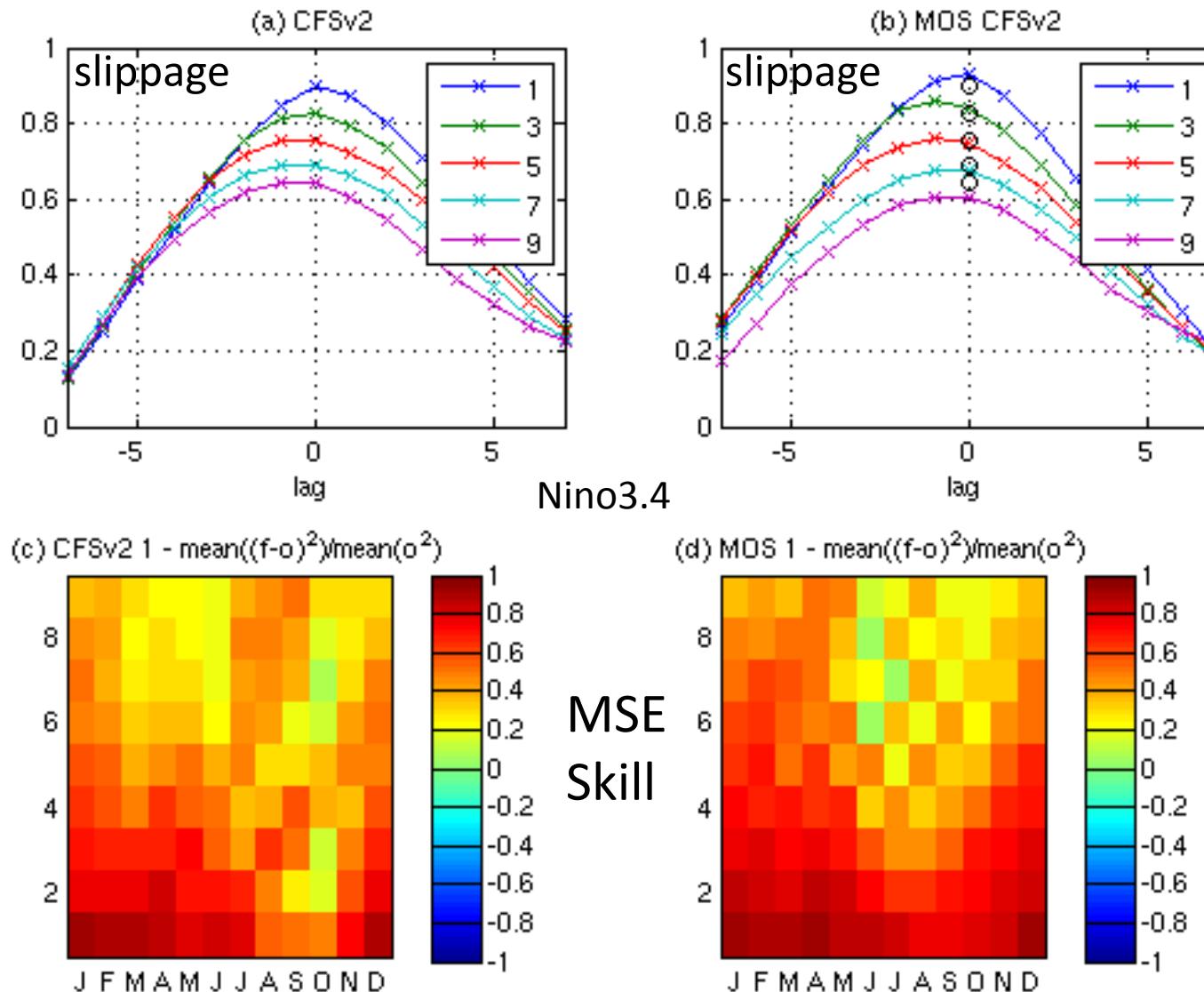
CFSv2 rmse(SD) before and after 1999 climate discontinuity corrections



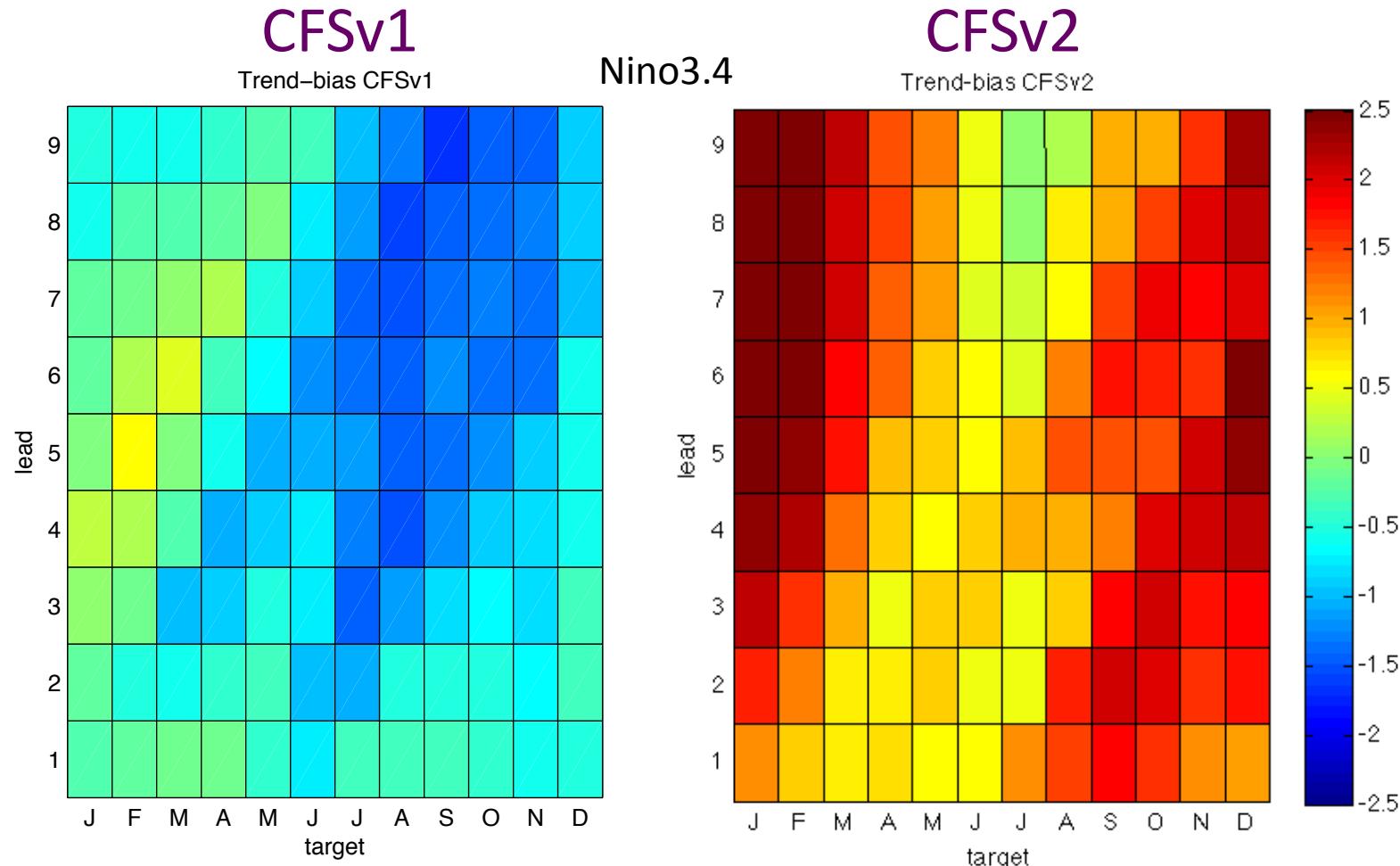
Target Period “Slippage” and MSE Skill in CFSv1



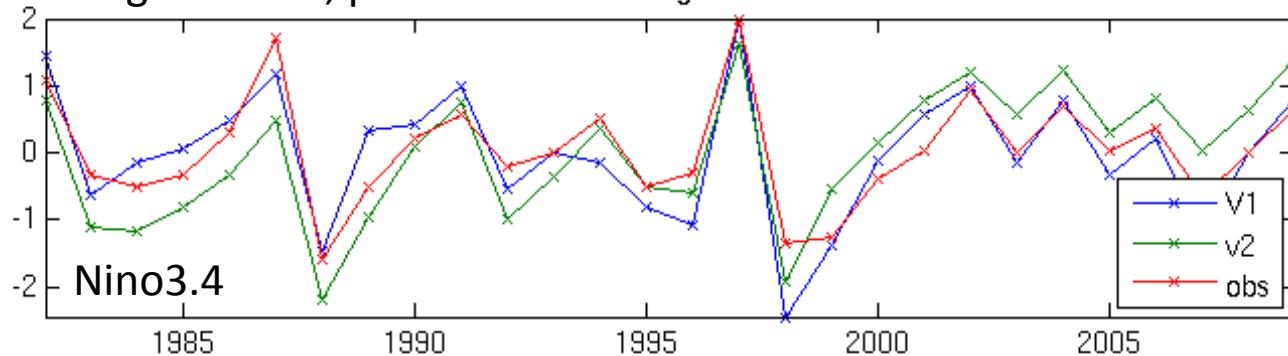
Target Period “Slippage” and MSE Skill in CFSv2



CFSv1: Trend bias in CFSv1 and CFSv2: 1982-2010 (difference [$^{\circ}$ C] per 28 years compared with obs)

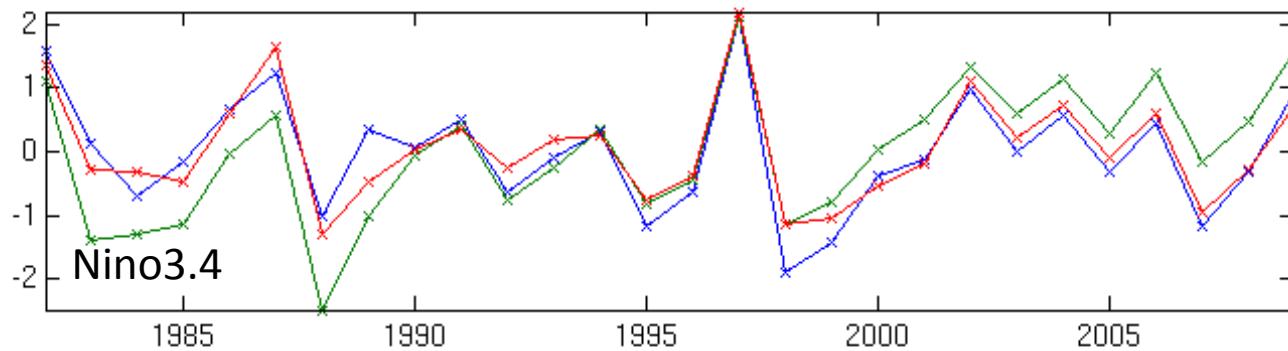


August starts, predictions for Aug



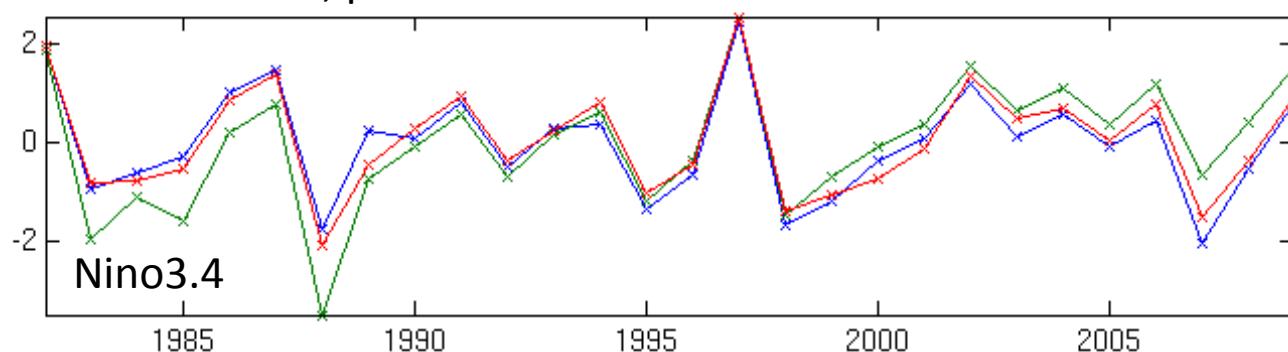
These 0-lead predictions for the first month at this time of year largely reflect initial conditions.

September starts, predictions for Sep



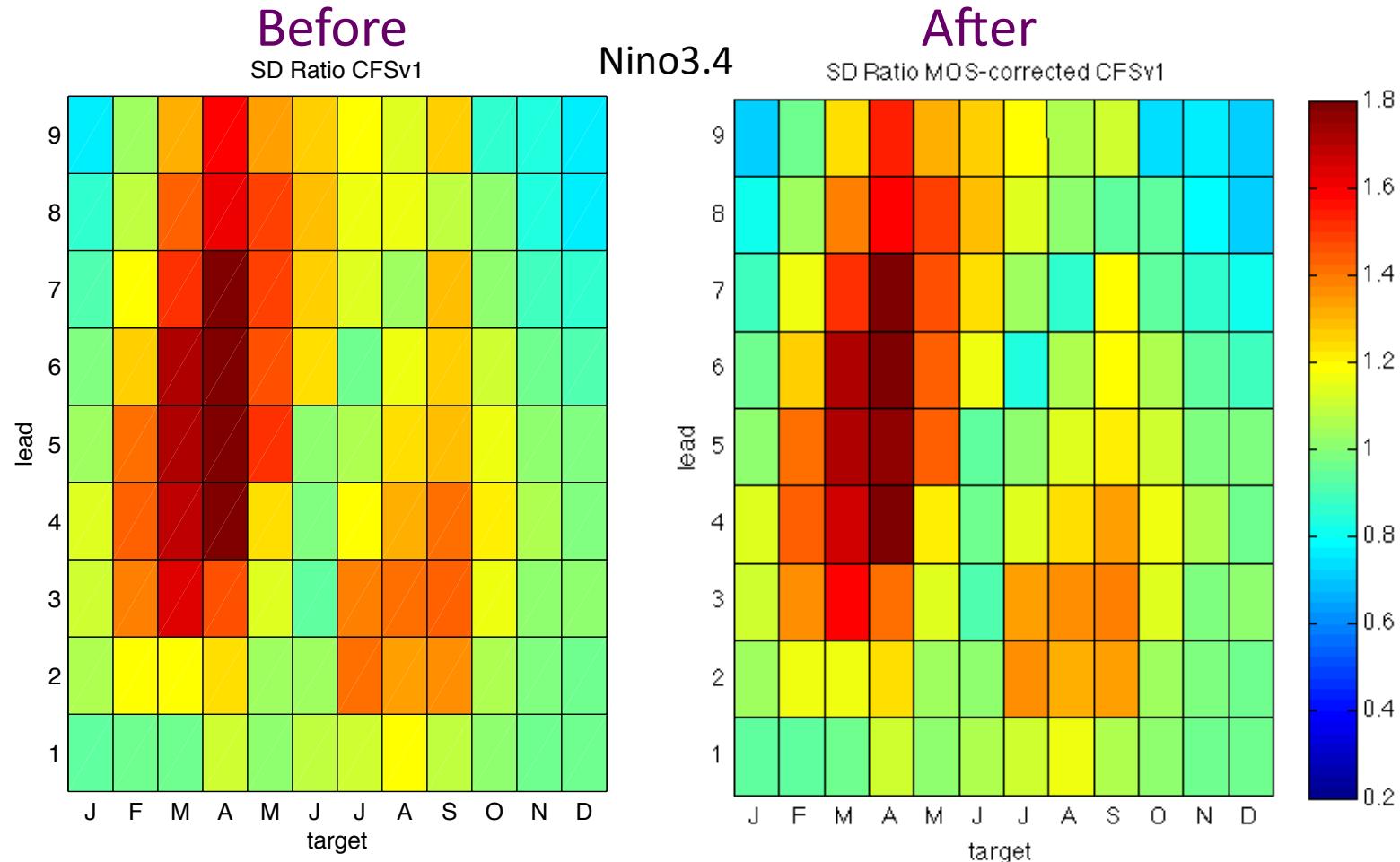
CFSv1
Increasingly shows mild negative bias;

October starts, predictions for Oct

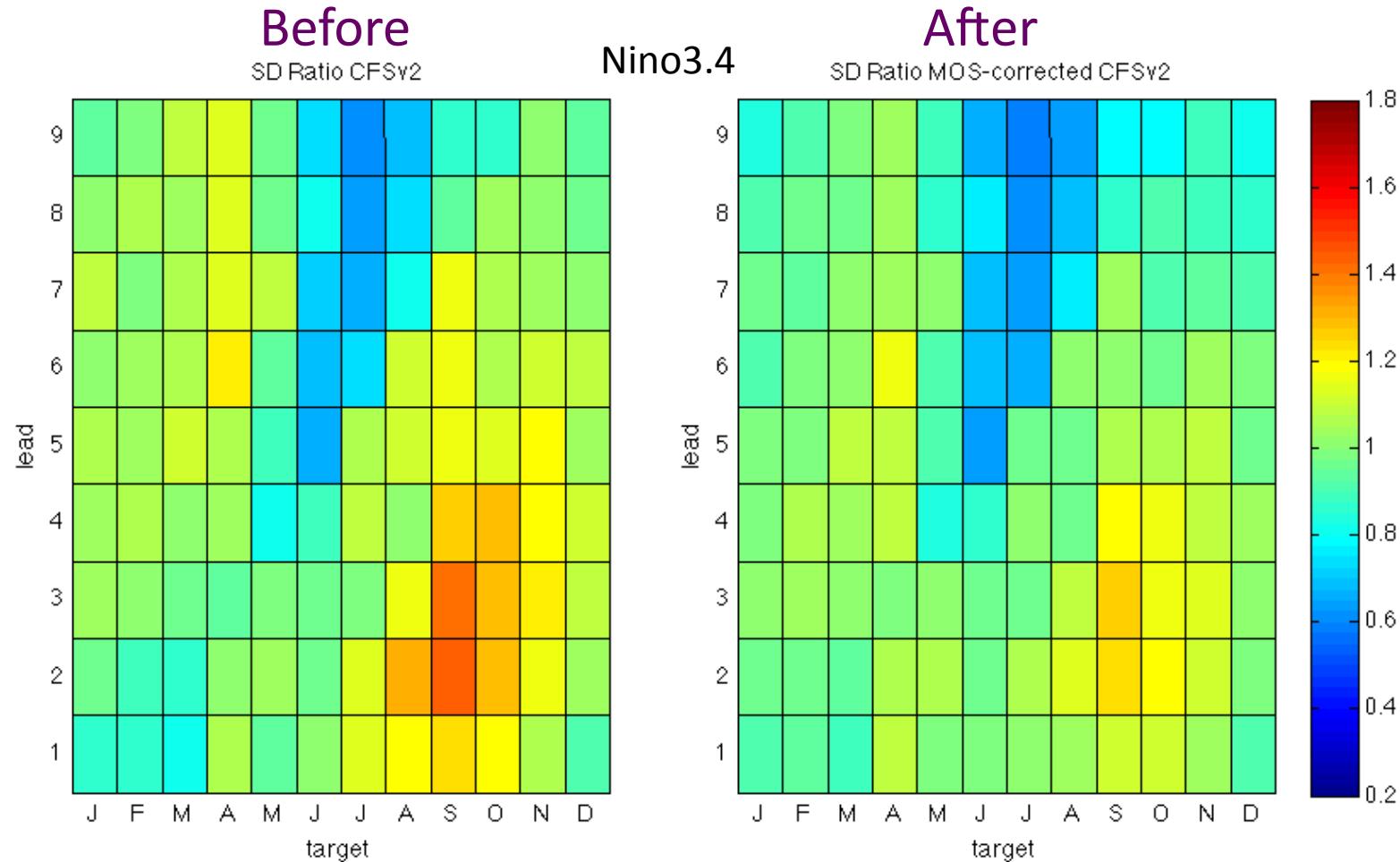


CFSv2
Increasingly shows moderate positive bias.

CFSv1 SD ratio (fcst/obs) before and after 1991 climate discontinuity corrections



CFSv2 SD ratio (fcst/obs) before and after 1999 climate discontinuity corrections



Conclusions

CFSv2 has a serious discontinuity near 1999 in initial condition climatology, partly hiding its general superiority to CFSv1 in predicting Nino3.4, especially for fall starts.

Once this discontinuity is accounted for, CFSv2 predicts Nino3.4 SST better than CFSv1:

- o Higher anomaly correlations
- o Lower RMSE
- o More realistic SD ratio (SD_{fcst}/SD_{obs})

CFSv2 has an steeper upward trend than seen in the obs, apart from the 1999 discontinuity (CO₂?)